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Sampling and Analysis Plan

Prepared for

Thompson Development Inc.

April 2015

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1.0 INTRODUCTION

On behalf of Thompson Development, Inc. (TDI), West Yost Associates (West Yost) has prepared a Sampling and Analysis Plan (SAP) for the Hamilton Square Parcel (Site), 970 C Street, Novato, California, see Figures 1, 2, and 3. This SAP was prepared to support TDI’s new residential development plan. Prior remedial action at the Site was conducted to meet the cleanup goals for a commercial site. The prior remedial action is described in Section 2.1 below.

This SAP provides proposed project sampling strategies for the subsurface investigation using site-specific information. The sampling strategies include the proposed sampling rationale and methods, and field, laboratory analytical and Quality Assurance/Quality Control (QA/QC) methods.

1.1 Site Area Background

The Site is located at a former Navy Exchange (NEX) gas station that was in use from the mid-1970s to the early 1990s and operated underground storage tanks (USTs) that stored gasoline. At the time the gas station was closed, the three USTs that had supported the NEX gas station (UST 970-1, UST 970-2, and UST 970-3) and one waste oil UST (UST-Waste Oil) were removed. Groundwater at the Site was subsequently found to be impacted by fuel releases from the NEX gas station. In addition, hydrocarbons were detected in soil beneath the station building during a subsurface investigation beneath the building subsequent to the removal of three hydraulic lifts and associated subsurface features.

1.2 Site Location

The Site is located at the northwest corner of Main Gate Road and C Street in Novato, California, see Figure 1. The Site comprises an area of approximately 2.7 acres (see Figure 2).

1.3 Project Organization

West Yost is performing this work for the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB), the California Department of Toxic Substances Control (DTSC), and the Department of the Navy (DON) under contract with the Site owner, TDI.

1.4 Project Overview

The goal of the remedial action at this Site is to improve Site subsurface soil and groundwater conditions to meet residential human health standards in preparation for redevelopment. Proposed remedial action in support of this goal consists of conducting secondary source removal in the vicinity of the former station building, pumps islands and UST excavations. Work will be performed under a soil and groundwater management plan and a Site-specific health and safety plan, which are presented under separate cover. The remedial action will prepare the Site for a future risk assessment that will be conducted to determine conformity with residential human health standards. When residential standards are met, the land use covenant (LUC) may be removed to allow for residential development.
2.0 BACKGROUND

2.1 Previous Investigations/Regulatory Involvement

A detailed description of previous investigations and regulatory involvement is presented in Section 2.3 of the Remedial Action Plan (RAP) dated April 10, 2015. In summary, the four former USTs were removed from the Site in 1995 and 1996, at which time petroleum hydrocarbon releases were discovered. Extensive investigations were completed for the DON to characterize the extent of petroleum hydrocarbon impacts primarily to groundwater. Active groundwater remediation using air sparging and soil vapor extraction was operated at the Site from 1998 until 2009. The remediation activities were terminated because petroleum hydrocarbon constituents in groundwater were decreased to below remediation goals with the exception of some residual methyl tert-butyl ether (MTBE). The DON continues to monitor groundwater on an annual basis to document continued MTBE reduction through natural attenuation.

2.2 Statement of the Specific Problems

The remediation work completed by the DON was sufficient for industrial uses of the Site, with the result that a LUC is attached to the property that precludes certain uses. TDI would like to redevelop the property for residential purposes which would require that the LUC be removed from the title. To accomplish this it is necessary to remove some limited residual soil impacts associated with the former USTs and releases beneath the station building at the Site. The RAP was developed to address residual soil contamination as described in Section 5.0 of the RAP.

This SAP is developed to support the confirmation sampling program that follows excavation activities proposed in the RAP.

2.3 Sampling Area Description

The sampling areas include sidewalls and floors of the proposed excavations shown on Figure 4. The sampling program includes discrete samples from pre-excavation characterization trenches, and a soil compositing system for the larger excavation that conforms to the Interstate Technology Regulatory Council’s (ITRC) Incremental Sampling Methodology (ISM) Technical and Regulatory Guidance Document, (February 2012) ISM. The specifics of this sampling rationale are discussed in Section 4.0.

2.4 Geologic Information

2.4.1 Site Geology

According to Battelle (2002), heterogeneous soil conditions predominate throughout the property. Surface soils consist mostly of a sandy “alluvial fill” material to depths ranging from 1.5 to about 9.5 feet below ground surface (ft bgs); a sandy clay fill encountered from about 5 to 7 ft bgs; and, sandy soils encountered at depths ranging from 7 to 15 ft bgs. These sandy soils are part of the aquifer zone and generally consist of clayey to gravelly sands, with clay lenses present throughout the aquifer zone. The underlying Cretaceous Franciscan bedrock, which is generally encountered from 15 to 20 ft bgs, is generally hard, massive, and slightly fractured.
Sampling and Analysis Plan

Regional groundwater flow in the aquifer is toward the north and is primarily controlled by the topography of the bedrock, which dips gently toward the north. The groundwater gradient beneath the Site calculated from Battelle’s 2013 Annual Site Status Report (Battelle, 2014) was approximately 0.3 of a foot per foot toward the north.

Surface water is primarily limited to Pacheco Creek, which extends along the west side of the Site. The soil and bedrock geology and the hydrogeology of the Site are discussed in more detail in the Conceptual Site Model, Section 4.0 of the RAP.

2.4.2 Groundwater

The depth to groundwater at the Site, and the resulting thickness of the unsaturated (vadose) zone, varies seasonally by approximately five feet (Battelle, 2002). Groundwater is unconfined across the Site. Higher groundwater elevations are evident during the late winter/early spring months, with the highest elevation in early spring (ECON and Blankinship & Associates, 2007). According to Battelle (2002), groundwater recharge in the alluvial aquifer originates primarily from precipitation. In addition, there is a significant amount of groundwater flux from portions of the aquifer that are upgradient in this bedrock valley. Based on the recharge conditions during the current drought, groundwater is likely to be encountered in the maximum range of depths in the summer and fall of 2015, until recharge begins with winter precipitation.

2.5 Environmental and/or Human Impact During Site Work

ECON and Blankinship & Associates (2007) developed a flow chart for their conceptual site model of the adjacent Site to the north of the Site, which has similar subsurface conditions and is also impacted with hydrocarbons in subsurface soil and groundwater. The flow chart depicts complete exposure pathways for on-site trench workers (outdoor air). Exposure pathways and potential receptors are discussed in greater detail in Section 4.6 of the RAP. For the purposes of this SAP, exposure pathways for dermal contact, soil ingestion and inhalation, and dermal contact for Site construction workers applies and will be mitigated through the Site Specific Health and Safety Plan.

3.0 PROJECT DATA QUALITY OBJECTIVES (DQOs)

The DQO process determines the level of data quality needed for specific data collection activities during sampling and analysis. The process begins with defining the problem at the Site, moves into a decision-making process that defines options and decision-making input, defines both temporal and physical study boundaries, develops a decision rule, and specifies limits on decision errors, all in order to optimize the plan design.

3.1 Project Tasks

The goals for the sampling and analysis described in this SAP are to provide data for a future human health risk assessment and to confirm that the excavation remedial action has reduced soil constituents of concern (COC) concentrations to below regulatory screening levels. To achieve these goals, West Yost will conduct three tasks, as follows:
### Sampling and Analysis Plan

- Pre-excavation potholing to characterize the subsurface in areas where data gaps have been found and for waste characterization
- Excavation guidance using field screening methods and a mobile laboratory
- Post-excavation confirmation sampling

#### 3.2 Data Quality Objectives

Table 1 lists the COCs that were determined based on previous investigation work. The table also lists the applicable regulatory standards to which the data will be compared. COC concentrations are compared to SFBRWQCB Environmental Screening Levels (ESLs) which are screening levels for substances commonly found in soil and groundwater at sites where releases of hazardous substances have occurred. The categories of “Residential Land Use (Groundwater is a Current or Potential Source of Drinking Water)” and “Groundwater Screening Levels (groundwater is a current or potential drinking water resource)” are used in reviewing SFBRWQCB ESL tables for the Site. The Site is proposed for redevelopment into a residential/commercial mixed use development and therefore the category of “Residential Land Use” is appropriate to use for the Site.

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Soil ESL(a), mg/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPHmo</td>
<td>100</td>
</tr>
<tr>
<td>TPHd</td>
<td>100</td>
</tr>
<tr>
<td>TPHg</td>
<td>100</td>
</tr>
<tr>
<td>Lead</td>
<td>80</td>
</tr>
<tr>
<td>Benzene</td>
<td>0.044</td>
</tr>
<tr>
<td>MTBE</td>
<td>0.023</td>
</tr>
<tr>
<td>Naphthalene</td>
<td>1.2</td>
</tr>
<tr>
<td>2-Methylnaphthalene</td>
<td>0.25</td>
</tr>
<tr>
<td>Benzo(a)pyrene</td>
<td>0.038</td>
</tr>
<tr>
<td>Benzo(b)fluoranthene</td>
<td>0.038</td>
</tr>
<tr>
<td>Benzo(a)anthracene</td>
<td>0.038</td>
</tr>
<tr>
<td>Benzo(a)pyrene</td>
<td>0.038</td>
</tr>
<tr>
<td>Tetraethyl Lead</td>
<td>0.00062(b)</td>
</tr>
</tbody>
</table>

(a) SFBRWQCB ESL Table A-1 Shallow Soil Screening Levels (≤ 3m bgs), Residential Land Use (groundwater is a current or potential drinking water resource), milligrams per kilogram (mg/kg) (December 2013).

(b) An ESL was not available so USEPA Regional Screening Level, January 2015 was used.

Abbreviations:
- MTBE = Methyl Tertiary Butyl Ether
- TPH = Total Petroleum Hydrocarbons/motor oil/diesel/gasoline
The COCs in soil at the Site are petroleum hydrocarbons and related compounds, tetraethyl lead from gasoline, and lead from lead-based paint. The residential ESLs for the COCs are listed in Table 1. It should be noted that Total Petroleum Hydrocarbons (TPH) as hydraulic oil (TPHo) and Total Oil and Grease (TOG) have been detected in soil at the Site, but there are no ESLs for them; therefore, the screening level for TPH as motor oil (TPHmo) will be used in their place.

### 3.3 Data Quality Indicators (DQIs)

The purpose of QA/QC procedures is to produce data of known and expected quality by satisfying certain DQIs of precision, accuracy, representativeness, comparability, and completeness. The performance criteria for laboratory analysis for the constituents of concern can be found in the USEPA Region 9 DQI Tables (various tables with various revision dates between 1999 and 2001).

Indicators of data quality as part of the QA/QC program include data precision, accuracy, representativeness, comparability, and completeness, as summarized in the following sections.

#### 3.3.1 Precision

Precision is the degree to which the analytical measurement is reproducible (i.e. that there is agreement between replicate measurements made under similar conditions for the same property). This is a measure of random error and can result from problems with sampling procedures, preservation, storage, shipment, preparation or analysis. Reproducibility among duplicate samples provides a determination of precision, which can be expressed as the relative percent difference in the amount of detected compounds between the original and duplicate samples. Relative percent difference (RPD) is quantified by the following equation:

$$
\text{RPD} = \left( \frac{C_1 - C_2}{C_1 + C_2}/2 \right) \times 100
$$

where:

- RPD = Relative percent difference
- $C_1$ = Larger of the two observed values
- $C_2$ = Smaller of the two observed values

Precision will be tracked by the analytical laboratory, Eurofins Calscience, Inc., of Davis, California, using spiked matrix samples. Table 2 outlines the reference methods and measurement quality objectives for the anticipated analyses.
## Table 2. Analytes, Reference Methods, and Measurement Quality Objectives

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Analytical Method</th>
<th>Sample Preparation</th>
<th>Analytical Instrumentation</th>
<th>Method Reporting Limit (µg/l)</th>
<th>Precision Objective Standard (%)</th>
<th>Accuracy Objective Range (%)</th>
<th>Data Quality Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPHg</td>
<td>8015B(a)</td>
<td>SW 3510(b)</td>
<td>SW 3545(c)</td>
<td>GC-FID</td>
<td>22 µg/l(2) 17 µg/kg(c)</td>
<td>20% 30%</td>
<td>52-127% 48-132%</td>
</tr>
<tr>
<td>TPHd</td>
<td>8015B(a)</td>
<td>SW 3510(b)</td>
<td>SW 3545(c)</td>
<td>GC-FID</td>
<td>44 µg/l(b) 0.77 mg/kg(c)</td>
<td>20% 30%</td>
<td>50-125% 53-115%</td>
</tr>
<tr>
<td>TPHmo</td>
<td>8015B(a)</td>
<td>SW 3510(b)</td>
<td>SW 3545(c)</td>
<td>GC-FID</td>
<td>14 µg/l(b) 1.8 mg/kg(c)</td>
<td>20% 30%</td>
<td>50-125% 53-115%</td>
</tr>
<tr>
<td>Benzene</td>
<td>8015B(a)</td>
<td>SW 3510(b)</td>
<td>SW 3545(c)</td>
<td>GC-FID</td>
<td>0.34 µg/l(b) 2.77 µg/kg(c)</td>
<td>20% 30%</td>
<td>67-140% 68-132%</td>
</tr>
<tr>
<td>Toluene</td>
<td>8015B(a)</td>
<td>SW 3510(b)</td>
<td>SW 3545(c)</td>
<td>GC-MS</td>
<td>0.34 µg/l(b) 2.77 µg/kg(c)</td>
<td>20% 30%</td>
<td>67-140% 68-132%</td>
</tr>
<tr>
<td>Ethylbenzene</td>
<td>8015B(a)</td>
<td>SW 3510(b)</td>
<td>SW 3545(c)</td>
<td>GC-MS</td>
<td>0.34 µg/l(b) 2.77 µg/kg(c)</td>
<td>20% 30%</td>
<td>67-140% 68-132%</td>
</tr>
<tr>
<td>Xylenes (total)</td>
<td>8015B(a)</td>
<td>SW 3510(b)</td>
<td>SW 3545(c)</td>
<td>GC-MS</td>
<td>0.34 µg/l(b) 2.77 µg/kg(c)</td>
<td>20% 30%</td>
<td>67-140% 68-132%</td>
</tr>
<tr>
<td>MTBE</td>
<td>8260B(a)</td>
<td>SW5030(b)</td>
<td>SW5035(c)</td>
<td>GC-MS</td>
<td>0.5 µg/l(b) 10 µg/kg(c)</td>
<td>20% 30%</td>
<td>70-130%</td>
</tr>
<tr>
<td>TBA</td>
<td>8260B(a)</td>
<td>SW5030(b)</td>
<td>SW5035(c)</td>
<td>GC-MS</td>
<td>5.0 µg/l(b) 50 µg/kg(c)</td>
<td>20% 30%</td>
<td>NOT SPIKED</td>
</tr>
<tr>
<td>Metals</td>
<td>6010B or EPA 200.7(b) 6010B(c)</td>
<td>EPA6010B or 200.7(b) SW 3050B(c)</td>
<td>ICP</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antimony</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10.0 µg/l(b) 5.0 µg/kg(c)</td>
<td>20% 30%</td>
<td>80-120% 75-125%</td>
</tr>
<tr>
<td>Lead</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5.0 µg/l(b) 0.13 mg/kg(c)</td>
<td>20% 30%</td>
<td>80-120% 68-118%</td>
</tr>
<tr>
<td>Mercury</td>
<td></td>
<td></td>
<td></td>
<td>CVAA</td>
<td>0.20 µg/l(b) 0.1 µg/kg(c)</td>
<td>20% 30%</td>
<td>80-120% 75-125%</td>
</tr>
</tbody>
</table>

Source: Analytical by Torrent Analytical Laboratory

(a) Water and soil samples  
(b) Water sample  
(c) Soil sample

Abbreviations  
µg/l - micrograms/liter (parts per billion)  
mg/kg - milligrams/kilogram (parts per million)  
MTBE - Methyl Tert-Butyl Ether  
PQL - Practical quantitation limit  
TBA - tert-Butyl Alcohol  
TPHg,d,mo - Total Petroleum Hydrocarbons gasoline, diesel fuel, motor oil
3.3.2 Accuracy

Accuracy is the evaluation of how close the analytical measurement is to the true value. Accuracy is a combination of random error (precision) and systematic error (bias). Accuracy for laboratory analytes is determined by comparing measured concentrations in a sample matrix against the measured concentration in a matrix spiked with a known amount. The formula for determining accuracy from matrix spike samples is:

\[
\text{Percent Recovery (\%)} = \frac{(B - A)}{T} \times 100
\]

where:
- \( B \) = measured concentration of spiked samples;
- \( A \) = measured concentration of unspiked samples; and
- \( T \) = true spiked concentration.

Samples will be spiked at mid calibration curve when possible.

3.3.3 Representativeness

Representativeness is a qualitative term describing the degree to which sample data typifies the characteristic of interest at the point of interest accurately and precisely. Representativeness of data from field sites is a function of the sampling process design and the sampling procedures discussed in Sections 4.0 and 6.0, which are designed to optimize the potential for obtaining samples that reflect the true state of the environment while maintaining practicability. All sampling methods follow standard protocols and are documented in Standard Operating Procedures (Appendix A). Sample types, frequency of collection, holding time and volumes are described in Table 3.

3.3.4 Comparability

Comparability is a qualitative term to describe the ability and appropriateness of taking two or more data sets to make collective conclusions. Issues to be considered include variables that could affect the descriptive value of the data for specific parameters at specific times using specific methods.

Considerations include:
- Variables of interest included;
- Common units used;
- Similarity of methods and QA;
- Time frames;
- Season;
- Pesticide/herbicide use
- Weather; and
- Equipment used.
(THIS PAGE LEFT BLANK INTENTIONALLY)
<table>
<thead>
<tr>
<th>Analyte/Analyte Group</th>
<th>Matrix</th>
<th>Analytical and Preparation Method/SOP Reference</th>
<th>Containers (Number, Size, and Type)</th>
<th>Minimum Sample Volume</th>
<th>Preservation</th>
<th>Preparation Holding Time</th>
<th>Analytical Holding Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPH, Purgeable - 8015</td>
<td>Solid</td>
<td>EPA METHOD 5035A, CLOSED SYSTEM PURGE AND TRAP / EPA METHOD 8015B (M): TOTAL PETROLEUM HYDROCARBONS BY GC-FID M213 / M507</td>
<td>Thin-necked bottle with methanol at a 1/1 ratio with sample volume (150 mL per replicate)</td>
<td>5 grams</td>
<td>0°C - 6°C</td>
<td>N/A</td>
<td>14 days</td>
</tr>
<tr>
<td>TPH, Extractable - 8015</td>
<td>Solid</td>
<td>EPA METHOD 8015B (M): TOTAL PETROLEUM HYDROCARBONS BY GC-FID M507</td>
<td>Provided by laboratory (per MIS SOP)</td>
<td>20 grams</td>
<td>0°C - 6°C</td>
<td>14 days</td>
<td>40 days</td>
</tr>
<tr>
<td>PCBs - 8082</td>
<td>Solid</td>
<td>EPA METHOD 3545, PRESSURIZED FLUID EXTRACTION (PFE) / EPA METHOD 8082, POLYCHLORINATED BIPHENYLS (PCBs) AS AROCLORS BY GAS CHROMATOGRAPHY M204 / M407</td>
<td>Provided by laboratory (per MIS SOP)</td>
<td>20 grams</td>
<td>0°C - 6°C</td>
<td>14 days</td>
<td>40 days</td>
</tr>
<tr>
<td>VOCs - 8260</td>
<td>Solid</td>
<td>EPA METHOD 5035A, CLOSED SYSTEM PURGE AND TRAP / EPA METHOD 8260B VOLATILE ORGANIC COMPOUNDS BY GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS) M204 / M404</td>
<td>Thin-necked bottle with methanol at a 1/1 ratio with sample volume (150 mL per replicate)</td>
<td>5 grams</td>
<td>0°C - 6°C</td>
<td>14 days</td>
<td>14 days</td>
</tr>
<tr>
<td>SVOCs - 8270</td>
<td>Solid</td>
<td>EPA METHOD 3545, PRESSURIZED FLUID EXTRACTION (PFE) / EPA METHOD 8270C, SEMIVOLATILE ORGANIC COMPOUNDS BY GAS CHROMATOGRAPHY / MASS SPECTROMETRY (GC/MS) M204 / M404</td>
<td>Thin-necked bottle with methanol at a 1/1 ratio with sample volume (150 mL per replicate)</td>
<td>20 grams</td>
<td>0°C - 6°C</td>
<td>14 days</td>
<td>40 days</td>
</tr>
<tr>
<td>Metals - 8010</td>
<td>Solid</td>
<td>EPA METHOD 30508, ACID DIGESTION OF SEDIMENTS, SLUDGES, AND SOILS / EPA METHOD 60108, INDUCTIVELY COUPLED PLASMA-ATOMIC EMISSION SPECTROMETRY (ICP-AES) M222 / M601</td>
<td>Provided by laboratory (per MIS SOP)</td>
<td>2.0 grams</td>
<td>0°C - 6°C</td>
<td>180 days</td>
<td>180 days</td>
</tr>
<tr>
<td>Mercury</td>
<td>Solid</td>
<td>EPA METHOD 7471A, MERCURY IN SOLID OR SEMISOLID WASTE (COLD-VAPOR TECHNIQUE) M620</td>
<td>Provided by laboratory (per MIS SOP)</td>
<td>0.6 grams</td>
<td>0°C - 6°C</td>
<td>28 days</td>
<td>28 days</td>
</tr>
<tr>
<td>Sample Prep</td>
<td>Solid</td>
<td>MULTI-INCREMENTAL SAMPLING (MIS) M235</td>
<td>Ziploc, or similar, sealable container</td>
<td>Analytical method dependent</td>
<td>0°C - 6°C</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TPH = Total Petroleum Hydrocarbons
PCBs = Polychlorinated Biphenyls
SVOCs = Semi-Volatile Organic Compounds
VOCs = Volatile Organic Compounds
Sampling and Analysis Plan

This SAP addresses these issues by describing the project objectives and planned activities under the project.

3.3.5 Completeness

Completeness describes the percentage of valid data achieved versus what was planned by a measurement system. Most importantly, enough data should be generated to draw correct conclusions. There are two components of data completeness: (1) the percentage of usable field samples taken of the samples planned; and (2) the valid (within QC objectives) data percentage of the total tests conducted. All data collected within the QA/QC limits set by this SAP for the project will be of value and can thus be used to draw conclusions concerning the impact of past uses on the Site.

The measurement quality objectives for sample analysis for the Site are outlined in Table 2. The objective for completeness (samples usable for analysis) will be defined as follows: for field sampling, 80 percent of soil samples. The specific number depends upon the number of samples actually collected. 100 percent of the data should meet the QA/QC objectives prescribed by this SAP. If the policies and procedures outlined in this SAP are not followed, or if the goals of the SAP are not met, re-sampling or re-testing will be performed.

3.4 Data Review and Validation

Data review and validation is the process of examining field collection and laboratory analytical procedures and the resulting data to determine how well they conform to the requirements stated by the SAP. Data validation under this project will be accomplished through routine audits and by monitoring of QC sample results. A tiered structure of validation will be accomplished as outlined below:

Tier 1: Daily summary forms review by Project Manager

Tier 2: Focused review of selected analytes by Project QA Manager

3.5 Data Management and Tier 1 Data Review

To assure that the project objectives, and more specifically the data quality objectives, are met the following series of steps will be performed in implementing this investigation:

1. The Project Manager will prepare a brief written scope of work that the Project Manager will review with the Field Representative. At this time the Project Manager will familiarize the Field Representative with the sampling locations, sampling protocols, sample handling requirements, and the overall data quality objectives.

2. The Field Representative will document all field activities, including instrument calibration, on standard field data and calibration sheets. Examples of these sheets are included in Appendix B.

3. The Field Representative will document all samples collected on a laboratory chain-of-custody record which will be transported with the samples to the laboratory.
4. The Project Manager will review the Field Representative’s field notes and the chain-of-custody record within 24 hours of collecting samples. If any field sampling discrepancies are noted that require correction by field or laboratory staff, the Project Manager will address them as soon as practicable with the staff. If necessary, additional samples may have to be collected and analyzed in accordance with this SAP.

5. The Project Manager will review the analytical laboratory report within 24 hours of receipt. The goal of this Tier 1 review is to quickly provide a brief summary of key analytical issues/deficiencies which might affect data quality, and, hence, the Project Manager’s decisions based on the data. Such a review may include review of the data package for completeness, review of chain of custody forms (against laboratory reported information) for signatures, sample condition upon receipt by the laboratory, sample preservation, review of holding times, review of QC summaries, review of blank results for possible field or laboratory contamination; random checks of reported results against raw data, and random checks of raw data for interference problems or system control problems (e.g., baseline anomalies, baseline drifts, etc.). Results of the review will at a minimum be recorded in the Project Manager’s log. The Project Manager may also prepare a memo summarizing the evaluated results, and/or a table of data showing data points (with associated qualifiers) that were considered to be biased or outside acceptance criteria for various DQIs by a large enough factor that use of the data might affect environmental decisions. If any discrepancies are noted, the Project Manager will address them as soon as practicable with the laboratory and if necessary, additional samples may have to be collected in accordance with this SAP.

6. The analytical data will be received in hard copy as well as electronically. After it is received and the data is validated the data will be inserted into tables to be used in the data report. The Project Manager will check that the data has been tabulated correctly.

### 3.6 Assessment Oversight and Tier 2 Data Review

The Quality Assurance Manager (QA Manager) will work with the Project Manager to assure that the above data management and data validation process is implemented correctly. This will be accomplished by conducting a Tier 2 Data Review, as well as performing the additional tasks outlined below.

The QA Manager will review the laboratory analytical data for the following:

1. Potential identification of significant and noticeable data quality issues/deficiencies, and

2. Review of the data for detected constituents of concern. This evaluation will not involve an in-depth review of all raw data. Constituents of concern in excess of the ESL as enumerated in Table 1 will be evaluated for use in delineating the extent of impact of the constituents. The goal of this evaluation would be to assess how remediation will be accomplished or if further assessment will be necessary. Particular attention will be paid to any constituents of concern detected in the water or soil samples above the regulatory standards presented in Table 1.
Sampling and Analysis Plan

3.6.1 Additional Tasks

Field surveillance leading to the preparation of Field Reports and detailed assessments of laboratory data packages is the responsibility of the project QA Manager. The QA Manager will follow up with the Project Manager within 24 hours of sample collection and will be available to support the Project Manager if any discrepancies with the SAP are noted.

The QA Manager also will follow up with the Project Manager within 24 hours of receipt and review of the analytical data, and will be available to support the Project Manager with any discrepancies if found. The QA Manager will provide a final data/document review once the data has been tabulated and the report has been written.

4.0 SAMPLING LOCATION RATIONALE

This SAP presents the soil sampling planned to address the question of potential impacts from current and past uses of the Site. Prior to excavation at the Site, pre-excavation soil characterization will be conducted in the trench locations shown on Figure 4. These locations were chosen for additional characterization because past analytical results indicate the potential presence of constituents of concern in and around the backfilled tank excavations, under the station office area, and in the north yard at concentrations exceeding ESLs. Up to 3 discrete samples will be collected from each trench in the manner discussed below. The samples from in and around the former tanks will be analyzed for TPHg and MTBE. The samples from the station office area will be analyzed for TPHg, TPHd, and TPHmo. And, the samples from the north yard will be analyzed for TPHg and MTBE. If there are locations at which soil is detected exceeding the ESLs, these locations will be over-excavated during the excavation phase. New DUs will be designated for these excavations and added to the sampling plan.

During the excavation phase of work, as soil is excavated to the maximum depth of the planned excavation, screening will be conducted using visual observation and with a photoionization detector (PID). When these screening methods indicate that the maximum extent of contaminated soil may have been reached, screening samples will be collected and analyzed in the field by a mobile laboratory operated by Analytical Sciences laboratory of Petaluma, California. The mobile laboratory screening will be particularly useful in the areas contaminated by the heavier hydrocarbons, which are not as easy to detect using hand-held field screening tools such as a PID.

This method will be used to guide and direct the excavation in real time. Field screening will be followed by confirmation sampling using ISM, discussed below.

ISM provides an estimate of the mean contaminant concentration in a defined volume (area and depth) of soil. Confirmation sampling will be based on decision units (DUs) designed for an excavation. Sidewalls and floors will be divided into DUs, within which a minimum of 30 increments of soil will be collected. The 30 increments from each DU will be combined in the field to make one sample (replicate), which will be processed and subsampled in the laboratory according to ISM protocols. Within each DU the 30 increments will be analyzed three times (three replicates). The two additional replicates will be used for field and laboratory quality control, discussed below.
Sampling and Analysis Plan

Additionally, a separate, unpreserved soil sample for percent moisture determination will be collected to report the ISM VOC results on a dry-weight basis. The soil sample will be collected in the same manner as the ISM VOC samples as an additional increment collected at each ISM increment location and placed in an unpreserved container (4 ounces or larger) provided by the laboratory.

Proposed DU locations are shown on Figure 5. Specific rationale for DU locations are discussed below and listed on Table 4. Analytes are also listed on Table 4, and discussed in Section 5. Quality control samples are listed on Table 4, and discussed in Section 10.

### Table 4. Sampling Rationale – Soil Samples

<table>
<thead>
<tr>
<th>DU Number</th>
<th>Sample Numbers&lt;sup&gt;(a)&lt;/sup&gt;</th>
<th>Analyses&lt;sup&gt;(b)&lt;/sup&gt;</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>DU1</td>
<td>DU1-A, DU1-B, DU1-C, DU1-M</td>
<td>TPHg, BTEX, MTBE, tetraethyl lead, PCBs, CAM 17 metals, VOCs, and SVOCs (and PAHs).</td>
<td>Downgradient of former UST locations and excavations and former pump islands.</td>
</tr>
<tr>
<td>DU2</td>
<td>DU2-A, DU2-B, DU2-C, DU2-M</td>
<td>TPHmo, TPHd, TPHg, BTEX, MTBE, tetraethyl lead, PCBs, CAM 17 metals, VOCs, and SVOCs (and PAHs).</td>
<td>Beneath station building in location of previously detected heavy hydrocarbons</td>
</tr>
<tr>
<td>DU3</td>
<td>DU3-A, DU3-B, DU3-C, DU3-M</td>
<td>TPHmo, TPHd, TPHg, BTEX, MTBE, tetraethyl lead, PCBs, CAM 17 metals, VOCs, and SVOCs (and PAHs).</td>
<td>Beneath former hydraulic lift</td>
</tr>
<tr>
<td>DU4</td>
<td>DU4-A, DU4-B, DU4-C, DU4-M</td>
<td>TPHg, BTEX, MTBE, tetraethyl lead, PCBs, CAM 17 metals, VOCs, and SVOCs (and PAHs).</td>
<td>Downgradient of former UST locations and excavations and former pump islands.</td>
</tr>
<tr>
<td>DU5</td>
<td>DU5-A, DU5-B, DU5-C, DU5-M</td>
<td>TPHg, BTEX, MTBE, tetraethyl lead, PCBs, CAM 17 metals, VOCs, and SVOCs (and PAHs).</td>
<td>Downgradient of former UST locations and excavations and former pump islands.</td>
</tr>
<tr>
<td>DU6</td>
<td>DU6-A, DU6-B, DU6-C, DU6-M</td>
<td>TPHg, BTEX, MTBE, tetraethyl lead, PCBs, CAM 17 metals, VOCs, and SVOCs (and PAHs).</td>
<td>Downgradient of former UST locations and excavations and former pump islands.</td>
</tr>
<tr>
<td>DU7</td>
<td>DU7-A, DU7-B, DU7-C, DU7-M</td>
<td>TPHg, BTEX, MTBE, tetraethyl lead, PCBs, CAM 17 metals, VOCs, and SVOCs (and PAHs).</td>
<td>Downgradient of former UST locations and excavations and former pump islands.</td>
</tr>
<tr>
<td>DU8</td>
<td>DU8-A, DU8-B, DU8-C, DU8-M</td>
<td>TPHg, BTEX, MTBE, tetraethyl lead, PCBs, CAM 17 metals, VOCs, and SVOCs (and PAHs).</td>
<td>Downgradient of former UST locations and excavations and former pump islands.</td>
</tr>
<tr>
<td>DU9</td>
<td>DU9-A, DU9-B, DU9-C, DU9-M</td>
<td>TPHg, BTEX, MTBE, tetraethyl lead, PCBs, CAM 17 metals, VOCs, and SVOCs (and PAHs).</td>
<td>Downgradient of former UST locations and excavations and former pump islands.</td>
</tr>
<tr>
<td>DU10</td>
<td>DU10-A, DU10-B, DU10-C, DU10-M</td>
<td>TPHg, BTEX, MTBE, tetraethyl lead, PCBs, CAM 17 metals, VOCs, and SVOCs (and PAHs).</td>
<td>Downgradient of former UST locations and excavations and former pump islands.</td>
</tr>
<tr>
<td>DU11</td>
<td>DU11-A, DU11-B, DU11-C, DU11-M</td>
<td>TPHg, BTEX, MTBE, tetraethyl lead, PCBs, CAM 17 metals, VOCs, and SVOCs (and PAHs).</td>
<td>Downgradient of former UST locations and excavations and former pump islands.</td>
</tr>
<tr>
<td>DU12</td>
<td>DU12-A, DU12-B, DU12-C, DU12-M</td>
<td>TPHg, BTEX, MTBE, tetraethyl lead, PCBs, CAM 17 metals, VOCs, and SVOCs (and PAHs).</td>
<td>Downgradient of former UST locations and excavations and former pump islands.</td>
</tr>
<tr>
<td>DU13</td>
<td>DU13-A, DU13-B, DU13-C, DU13-M</td>
<td>TPHg, BTEX, MTBE, tetraethyl lead, PCBs, CAM 17 metals, VOCs, and SVOCs (and PAHs).</td>
<td>Downgradient of former UST locations and excavations and former pump islands.</td>
</tr>
<tr>
<td>DU14</td>
<td>DU14-A, DU14-B, DU14-C, DU14-M</td>
<td>TPHg, BTEX, MTBE, tetraethyl lead, PCBs, CAM 17 metals, VOCs, and SVOCs (and PAHs).</td>
<td>Downgradient of former UST locations and excavations and former pump islands.</td>
</tr>
<tr>
<td>DU15</td>
<td>DU15-A, DU15-B, DU15-C, DU15-M</td>
<td>TPHg, BTEX, MTBE, tetraethyl lead, PCBs, CAM 17 metals, VOCs, and SVOCs (and PAHs).</td>
<td>Downgradient of former UST locations and excavations and former pump islands.</td>
</tr>
</tbody>
</table>

<sup>(a)</sup> Samples ending in M will be used for moisture content only

<sup>(b)</sup> Analytical methods per Table 3

Abbreviations:
- BTEX = Benzene, Toluene, Ethylbenzene, Xylenes
- MTBE = Methyl Tert-Butyl Ether
- PAH = Polycyclic Aromatic Hydrocarbons
- PCBs = Polychlorinated Biphenyls
- SVOCs = Semi-Volatile Organic Compounds

### 4.1 Soil Sampling Locations

As discussed in Section 2.3 above, confirmation sampling of the excavations will be conducted in accordance with the ITRC’s ISM. This method involves sampling in designated increments over widespread areas; therefore, the sampling locations will essentially be spread throughout the entire excavated area of the Site, including excavation sidewalls. This section describes the rationale behind the placement and depths of the DUs for sampling, as well as the analytes for each DU. A DU is described as the smallest volume of soil about which a decision is to be made (ITRC, 2012).
Sampling and Analysis Plan

DU s are Site-specific and investigation specific, and can be used to make decisions for risk assessment or for remediation. For the Site, the DUs are intended to be used for both remediation confirmation sampling and for risk assessment. Each DU is primarily designated as a remediation unit, but each DU will also be used as an exposure area in the preparation of a future risk assessment for the Site.

The rationale for the designation of each DU is as follows:

- **DUs 1-9**: These DUs are all either directly upgradient of the former gasoline USTs or are located in the vicinity of or downgradient of the pump islands. Because this is a large excavation area it was divided in half for the purpose of designating DUs. The COCs for this area are those that are known to have been released from the USTs, the pumps, or related piping.

- **DUs 10-14**: These DUs comprise the walls and floor of a proposed six foot deep excavation underneath the station building. COCs have been detected underneath the building in this area during removal of the hydraulic lifts, oil water separators, and associated piping and lines underneath the building.

- **DU 15**: This DU is a small area in which hydraulic oil was detected in deep soil (10 ft bgs) after removal of a hydraulic lift. The DU is an excavation floor area only.

**5.0 REQUEST FOR ANALYSIS**

This section discusses analytical support for the project, which depends on several factors including rationale for the analyses requested, analytes of concern, and laboratory information. QC sampling rationale is discussed in Section 10.0.

**5.1 Analysis Narrative**

As discussed in Section 4.1, analytes for each DU are based on past detections near each DU.

- **DUs 1 through 9**: These DUs are all either directly upgradient of the former gasoline USTs or are located in the vicinity of or downgradient of the pump islands. The analytes for this area are those that are known to have been released from the USTs, the pumps, or related piping, or are those required for health risk assessment. These analytes include TPHg, BTEX, MTBE, Total Organic Lead, PCBs, CAM 17 metals, VOCs, and SVOCs (and PAHs).

- **DUs 10 through 14**: These DUs comprise the walls and floor of a proposed six foot deep excavation underneath the station building. COCs that have been detected underneath the building in this area are: hydraulic oil; TPHd, and metals. In addition, PCBs may have been contained in the hydraulic oil and tetraethyl lead in the gasoline. Therefore, the analytes are TPHmo, TPHd, TPHg, BTEX, MTBE, Total Organic Lead, PCBs, CAM 17 metals, VOCs, and SVOCs (and PAHs).

- **DU 15**: This DU is a small area in which hydraulic oil was detected in soil after removal of a hydraulic lift. The DU includes the excavation floor and walls and the analytes TPHmo, TPHd, TPHg, BTEX, MTBE, Total Organic Lead, PCBs, CAM 17 metals, VOCs, and SVOCs (and PAHs).
The pre-excavation characterization samples will also be analyzed for the constituents detected in past samples collected in their vicinity. As such, samples from the trenches in and around the former tanks and from the north yard will be analyzed for the same suite as DU 1 through 9, a samples from the station office area will be analyzed for the suite used for DU 10 through 14.

Table 2 summarizes the requested analytical methods.

## 5.2 Analytical Laboratories

On-site pre-confirmation sample screening laboratory services will be provided by Analytical Sciences laboratory of Petaluma, California. Analytical Sciences is certified by the State of California to perform the requested analyses.

All ISM samples will be submitted to Eurofins Calscience, Inc. laboratory (Eurofins) in Davis, California. Eurofins is certified by the State of California to perform the requested analyses and has experience processing and analyzing ISM samples.

### 6.0 FIELD METHODS AND PROCEDURES

#### 6.1 Field Equipment

**6.1.1 List of Equipment Needed**

Equipment needed to implement this SAP includes:

- Organic Vapor Meter (OVM) to determine the presence or absence of VOCs in soil;
- Hand sampler (hammer-type);
- Brass sample sleeves for hand sampler;
- Encore™-type samplers;
- Small coring-type samplers for ISM;
- Sample containers, labels, cooler(s), ice; and
- Plastic sheeting for temporarily stockpiling soil, if necessary.

**6.1.2 Calibration of Field Equipment**

The OVM must be calibrated prior to use in the field. The OVM uses a PID and is calibrated prior to field work to 100 parts per million of 1-liter of isobutylene. The instrument should be calibrated at the beginning of each work day. The flammable gas meter will calibrated according to the manufacturer’s recommendation for the model being used.
6.2 Field Screening

Field personnel will use an OVM to assess the presence or absence of VOCs in soil samples chosen for field screening. The OVM, which measures in parts per million by volume (ppmv), is used for qualitative, not quantitative, assessment because the correlation between the volume measurements of the OVM and the weight measurements of the laboratory instruments is not well defined.

A field screen sample will be obtained with a sampler immediately adjacent to the marked sample location. A clod of the soil (approximately 50 grams) to be screened will be removed from the sampler and placed in a zipper-type freezer bag and sealed.

The field screen sample will then be separated into several pieces in the bag and allowed to temperature-equilibrate for approximately 15 to 30 minutes in the sun, allowing any VOCs which might be present in the soil to volatize out into the bag’s headspace. The OVM nozzle will then be placed inside the sealed bag, by puncturing a small hole in the side of the bag, in order to measure the VOCs present, if any, in the headspace. The nozzle will remain inside the bag for approximately 15 to 30 seconds or until the maximum reading has been recorded on the OVM readout panel. The depth from which the sample came and the corresponding OVM reading will be recorded on the original field log sheet.

When this screening method indicates that the maximum extent of contaminated soil has likely been reached, screening samples will be collected and analyzed in the field by a mobile laboratory operated by Analytical Sciences laboratory. The mobile laboratory screening will be particularly useful in the areas contaminated by the heavier hydrocarbons, which are not as easy to detect using hand-held field screening tools such as a PID.

This method will be used to guide and direct the excavation in real time. Field screening the soil before confirmation sampling is intended to prevent re-mobilization of excavation equipment and repeat confirmation sampling with the goal of saving both time and money.

6.3 Soil Sampling

6.3.1 Soil Sampling

The following describes soil sampling procedures that will be used by field personnel to collect and handle soil samples:

Before samples are collected, careful consideration will be given to the type of analysis to be performed so that precautions are taken to prevent loss of volatile components or contamination of the sample, and to preserve the sample for subsequent analysis. All sampling equipment will be washed with an Environmental Protection Agency (EPA) approved detergent (such as liquinox or trisodium phosphate) between DUs to prevent cross-contamination.
6.3.1.1 ISM Sampling of DUs

The pre-defined DUs will first be gridded-off into uniform cells equivalent to the number of increments to be collected from each DU (a minimum of 30). Using the systematic random design, a random position will be established for a given cell, and then the same position will be repeated in all of the remaining cells in the DU.

Non-VOC ISM samples of exposed soils will be collected and combined as follows: Increments will be collected from directly below the surface of each DU (excavation wall or floor) with small coring devices such as the Core N’ One™ tool, the Terra Core Sampler, or Easy Draw Syringe® and PowerStop Handle®. Due to practical limitations, increments of similar volume rather than of similar mass will be collected. Each sample increment will be approximately 5 grams by volume. Individual increments will not be weighed in the field during collection. Similar mass per increment is assumed with similar volume collected. All of the increments from a DU will be combined in a sample container provided by the laboratory.

VOC ISM samples of exposed soils will be collected and combined in similar fashion as non-VOC ISM samples with the exception that they will be field-preserved in methanol. Increments will be collected from directly below the surface of each DU (excavation wall or floor) with small coring devices such as the Core N’ One™ tool, the Terra Core Sampler, or Easy Draw Syringe® and PowerStop Handle®. All of the increments from a DU will be combined in a sample bottle containing a predetermined volume of methanol. All samplers will either be disposed of or decontaminated between DUs as described below.

6.3.1.2 Discrete Sampling in Pre-excavation Characterization Trenches

Discrete soil samples will be collected for pre-excavation characterization by trenching in select locations. Samples will be collected from trench sidewalls using a slide hammer with a hand sampler lined with 2-inch I.D. x 6-inch long steamed-cleaned or new brass or stainless steel sample sleeves. The sampler will be lowered into the trench and driven 6 inches into the trench wall or floor using the slide hammer.

The sampler will then be extracted from the soil and the sample sleeve carefully removed for analysis. To minimize volatilization of VOCs within the soil matrix, samples for VOCs will be collected from the sleeve immediately upon extraction from the sampler in hermetically sealed Encore™ samplers. Samples that are to be preserved in the field will be preserved immediately with methanol or the appropriate acid preservative. Care will be taken to preserve a cohesive matrix and minimize surface area exposed to the atmosphere to minimize volatilization. The remaining soil in the sleeve will be sealed with Teflon tape beneath polyethylene end caps. The caps will be hermetically sealed to the brass tube with duct tape. The tube and the Encore™ samplers will then be labeled and handled as described in Section 9.0.
6.3.2 Decontamination Procedures

Re-usable sampling equipment will be decontaminated between each sample collected using the following procedure:

- Non-phosphate detergent and tap water wash, using a brush if necessary;
- Tap water rinse; and
- De-ionized/distilled water rinse (twice).

Equipment will be decontaminated in a pre-designated area on pallets or plastic sheeting, and clean bulky equipment will be stored on plastic sheeting in uncontaminated areas. Small equipment that has been cleaned will be stored in plastic bags. Materials to be stored more than a few hours will also be covered.

7.0 SAMPLE CONTAINERS, PRESERVATION AND STORAGE

7.1 Soil Samples

Soil samples will be chilled in an iced cooler immediately upon collection and stored at 4°C during transport to the laboratory.

Table 3 in Section 3.3.3 above summarizes the required containers and holding times for the various analyses for soil samples.

8.0 DISPOSAL OF RESIDUAL MATERIALS

In the process of collecting environmental samples during the Site investigation, the West Yost sampling team will generate different types of potentially contaminated investigation derived waste (IDW) that include the following:

- Used personal protective equipment (PPE);
- Used, disposable sampling equipment; and
- Decontamination fluids.

The EPA's National Contingency Plan (NCP) requires that management of IDW generated during sampling comply with all applicable or relevant and appropriate requirements (ARARs) to the extent practicable. The sampling plan will follow the Office of Emergency and Remedial Response (OERR) Directive 9345.3 02 (May 1991), which provides the guidance for the management of IDW. In addition, other legal and practical considerations that may affect the handling of IDW will be considered.

Used PPE and disposable equipment will be double bagged and placed in a municipal refuse dumpster. These wastes are not considered hazardous and can be sent to a municipal landfill. Any PPE and disposable equipment that is to be disposed of which can still be reused will be rendered inoperable before disposal in the refuse dumpster.
Decontamination fluids that will be generated in the sampling event will consist of deionized water, residual contaminants, and water with non-phosphate detergent. The fluids will be placed directly into 55-gallon drums that will be temporarily stored on-site pending receipt of analytical results. Based on the laboratory data derived from the investigation, West Yost will prepare a disposal package and coordinate the disposal of the drums.

9.0 SAMPLE DOCUMENTATION AND SHIPMENT

9.1 Field Notes

Field operations will be documented on preprinted daily field report forms and calibration sheets. Photographs also may be taken to document Site conditions during sampling. Information to be maintained is listed below.

9.1.1 Daily Field Reports

The Daily Field Reports will be used to document where, when, how, and from whom any vital project information was obtained. Report entries will be complete and accurate in order to permit reconstruction of field activities. A separate report will be maintained for each sampling event. Reports will have consecutively numbered pages. All entries will be legible, written in black ink, and signed by the individual making the entries.

At a minimum, the following information will be recorded during the collection of each sample:

- Sample location and description;
- Site or sampling area sketch showing sample location and measured distances;
- Sampler's name(s);
- Date and time of sample collection;
- Type of sample (soil, or water);
- Type of sampling equipment used;
- Field instrument readings and calibration;
- Field observations and details related to analysis or integrity of samples (e.g., weather conditions, noticeable odors, colors, etc.);
- Preliminary sample descriptions (e.g., for soils: clay loam, very wet; for water: clear water with strong ammonia like odor);
- Sample preservation methods;
- Sample identification numbers and any explanatory codes, and chain of custody form numbers;
- Shipping arrangements (overnight airbill number); and
- Name(s) of recipient laboratory(ies).
In addition to the sampling information, the following specific information will also be recorded on the Daily Field Report for each day of sampling:

- Team members and their responsibilities;
- Time of arrival/entry on-site and time of Site departure;
- Other personnel on-site;
- Summary of any meetings or discussions with tribal, contractor, or federal agency personnel;
- Deviations from sampling plans, Site Safety Plans, and SAP procedures;
- Changes in personnel and responsibilities with reasons for the changes;
- Levels of safety protection; and
- Calibration readings for any equipment used and equipment model and serial number.

9.1.2 Photographs

Photographs may be taken at the sampling locations and at other areas of interest on-site or sampling area. They will serve to verify information entered in the field logbook. For each photograph taken, the following information will be written in the logbook or recorded in a separate field photography log:

- Time, date, location, and weather conditions;
- Description of the subject photographed; and
- Name of person taking the photograph.

9.2 Labeling

All samples collected will be labeled in a clear, precise, and permanent way for proper identification in the field and for tracking in the laboratory. A copy of the sample label is included in Appendix B. The samples will have pre-assigned, identifiable, and unique numbers. At a minimum, the sample labels will contain the following information: station location, date of collection, analytical parameter(s), and method of preservation. Every sample, including samples collected from a single location but going to separate laboratories, will be assigned a unique sample number.

9.3 Sampling Chain of Custody Forms and Custody Seals

Chain of custody records are used to document sample collection and shipment to laboratories for analysis. The sample numbers for all samples, including equipment rinseate samples, reference samples, laboratory QC samples, and duplicates will be documented on this form (see Section 10.0). All sample shipments for analysis will be accompanied by a chain of custody record. A copy of this form is included in Appendix B. Record(s) will be completed and sent with the samples for each laboratory and each shipment (i.e., each day). If multiple coolers are sent to a single laboratory on a single day, separate record(s) will be completed and sent with the samples for each cooler.
Sampling and Analysis Plan

The chain of custody record will identify the contents of each shipment and maintain the custodial integrity of the samples. Generally, a sample is considered to be in someone's custody if it is either in someone's physical possession, in someone's view, locked up, or kept in a secured area that is restricted to authorized personnel. Until the samples are shipped, the custody of the samples will be the responsibility of West Yost. The Field Representative will sign the chain of custody record in the "relinquished by" box and note date, time, and airbill number. A photocopy will be made for West Yost’s master files.

A self-adhesive custody seal will be placed across the lid of each sample. A copy of the seal is found in Appendix B. The shipping containers in which samples are stored (usually a sturdy picnic cooler or ice chest) will be sealed with self-adhesive custody seals any time they are not in someone's possession or view before shipping. All custody seals will be signed and dated.

9.4 Packaging and Shipment

All sample containers will be placed in a sturdy picnic cooler. The following outlines the packaging procedures that will be followed for low concentration samples.

1. When ice is used, pack it in zip locked, double plastic bags. Seal the drain plug of the cooler with fiberglass tape to prevent melting ice from leaking out of the cooler.
2. The bottom of the cooler should be lined with bubble wrap to prevent breakage during shipment.
3. Check screw caps for tightness and, if not full, mark the sample volume level of liquid samples on the outside of the sample bottles with indelible ink.
4. Custody seal all container tops.
5. Affix sample labels onto the containers.
6. Wrap all glass sample containers in bubble wrap to prevent breakage.
7. Seal all sample containers in heavy duty plastic zip-lock bags.
8. Place samples in a sturdy cooler(s).
9. Fill empty space in the cooler with bubble wrap or Styrofoam peanuts to prevent movement and breakage during shipment.
10. Ice used to cool samples will be double sealed in two zip lock plastic bags and placed on top and around the samples to chill them to the correct temperature.
11. Each ice chest will be securely taped shut with fiberglass strapping tape, and custody seals will be affixed to the front, right and back of each cooler.
Sampling and Analysis Plan

Records of the following information will be maintained by West Yost’s field representative:

- Name and location of the Site or sampling area;
- Total number(s) by estimated concentration and matrix of samples shipped to each laboratory;
- If not carried by courier, carrier, air bill number(s), method of shipment (priority next day);
- Shipment date and date it should be received by lab;
- Irregularities or anticipated problems associated with the samples; and
- Whether additional samples will be shipped or if this is the last shipment.

10.0 QUALITY CONTROL

10.1 Field Quality Control Samples

Field quality control samples are intended to help evaluate conditions resulting from field activities and are intended to accomplish two primary goals; assessment of field contamination and assessment of sampling variability. The assessment of field contaminants looks for substances introduced in the field due to environmental factors or sampling equipment, and is done by using blanks of different types. The assessment of sampling variability includes variability due to sampling technique and instrument performance as well as variability possibly caused by the heterogeneity of the matrix being sampled. The following sections cover field QC.

10.1.1 Assessment of Field Variability (Field Duplicate or Co-located Samples)

One of the three replicate samples from each of the DUs will be used as a field duplicate. The duplicates will be “blind” samples so that they will not be recognized by the laboratory as duplicates; therefore, they will be labeled with sample numbers similar to those of the primary sample from each DU.

Field duplicates of the discrete soil samples will be collected from the trench on the west side of the gas UST excavation. The samples will be collected at this location because it is the location of previous releases. The duplicate soil sample will be designated they are blind sample identification numbers.

Duplicate samples will be preserved, packaged, and sealed in the same manner as other samples of the same matrix. A separate sample number and station number will be assigned to each duplicate, and it will be submitted blind to the laboratory.

10.2 Laboratory Quality Control Samples

Laboratory quality control samples are intended to assess the precision of the laboratory subsampling process. One of the three replicate samples from each of the DUs will be used as a laboratory duplicate. The duplicates will be “blind” samples so that they will not be recognized by the laboratory as duplicates; therefore, they will be labeled with sample numbers similar to those of the primary sample from each DU.
11.0 FIELD VARIANCES

As conditions in the field may vary, it may become necessary to implement minor modifications to sampling as presented in this plan. When appropriate, the Project Manager will be notified and verbal approval will be obtained before implementing the changes. Modifications to the approved plan will be documented in the sampling project report.

12.0 FIELD HEALTH AND SAFETY PROCEDURES

A Site specific Health and Safety Plan has been prepared for this investigation. A copy of that plan is included in Appendix C.
FIGURE 1

Remedial Action Plan
Hamilton Square
970 C Street, Novato, CA
(T0609592161)

Site Location

LEGEND
Approximate Site Boundary
(THIS PAGE LEFT BLANK INTENTIONALLY)
FIGURE 2
Remedial Action Plan
Hamilton Square
970 C Street, Novato, CA
(T0609592161)

Site Vicinity
FIGURE 5
Remedial Action Plan
Hamilton Square
970 C Street, Novato, CA
(T0609592161)
Incremental Sampling Methodology Plan

LEGEND
- Decision Unit
- Vertical "Wall" Decision Unit (based on excavation depth)
- Estimated Extent of Tank Excavation
- Approximate Site Boundary
(THIS PAGE LEFT BLANK INTENTIONALLY)
FIGURE 4
Remedial Action Plan
Hamilton Square
970 C Street, Novato, CA
(T0609592161)

Proposed Excavations
- 6' bgs (TPHd/mo)
- 7' bgs
- 10' bgs
FIGURE 3
Remedial Action Plan
Hamilton Square
970 C Street, Novato, CA
(T0609592161)

Site Plan
(THIS PAGE LEFT BLANK INTENTIONALLY)
OVM READINGS PROCEDURE

The following describes the procedure used for monitoring volatile organic compounds during field work.

Field personnel will use an organic vapor meter (OVM) to determine the presence or absence of volatile organic compounds (VOCs) in soil samples chosen for field screening. The OVM uses a photoionization detector (PID) and is calibrated prior to field work to 100 parts per million of 1-liter of isobutylene. The OVM, which measures in parts per million by volume (ppmv), is used for qualitative, not quantitative, assessment because the correlation between the volume measurements of the OVM and the weight measurements of the laboratory instruments is not well defined.

A field screen sample is obtained from the brass tube immediately above or below the brass tube containing the sample selected for possible analysis. A clod of the soil (approximately 50 grams) to be screened is removed from the brass tube, and is placed in a Zip-Lock freezer bag and sealed.

The field screen sample is separated into several pieces in the bag and allowed to temperature equilibrate for approximately 15 to 30 minutes in the sun, allowing any VOCs which might be present in the soil to volatize out into the bag’s headspace. The OVM nozzle is then placed inside the sealed bag, by puncturing a small hole in the side of the bag, in order to measure the VOCs present, if any, in the headspace. The nozzle remains inside the bag for approximately 15 to 30 seconds or until the maximum reading has been recorded on the OVM readout panel.

The depth from which the sample came and the corresponding OVM reading is recorded on the original field log sheet. Field observations, OVM and (odor and staining) readings are used in determining which soil samples are to be analyzed in the laboratory.
SOIL SAMPLING WITH ENCORE PROCEDURE

Before samples are collected, careful consideration is given to the type of analysis to be performed so that precautions are taken to prevent loss of volatile components or contamination of the sample, and to preserve the sample for subsequent analysis. All drilling and sampling equipment is steam-cleaned between boreholes to prevent cross-contamination. The sampler is washed with an EPA approved detergent (such as liquinox or trisodium phosphate) between sample collection.

Soil samples are collected at pre-specified depth intervals or at a sediment/lithologic change for hydrogeologic description and possible chemical analysis. Samples are collected using a slide hammer with a hand sampler lined with 2-inch I.D. x 6-inch long steamed-cleaned or new brass or stainless steel sample sleeves.

The sampler is then extracted from the borehole and the middle or bottom brass tube is carefully removed for possible analysis. To minimize volatilization of VOCs within the soil matrix, samples for VOCs are collected from the tube immediately upon extraction from the split-spoon sampler in hermetically sealed Encore™ samplers. Samples that are to be preserved in the field are preserved immediately with methanol or the appropriate acid preservative. Care will be taken to preserve a cohesive matrix and minimize surface area exposed to the atmosphere to minimize volatilization. The remaining soil in the tube is sealed with Teflon tape beneath polyethylene end caps. The sample is then labeled to include the date, boring number, depth of sample, project number, and the field personnel’s initials. The samples are put into a plastic “zip-lock” type bag and placed into an ice chest maintained below 4°C with blue ice or dry ice, for transport under chain of custody to the laboratory. The chain-of-custody form includes the project number, analysis requested, sample ID, date, time, sample matrix and the field personnel’s name. The form is signed, dated and timed by each person who yields or receives the samples beginning with the field personnel and ending with the laboratory personnel.
## Environmental Analysis Request/Chain of Custody

### Client:

<table>
<thead>
<tr>
<th>Project Name/#:</th>
<th>Site ID #:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Manager:</td>
<td>P.O. #:</td>
<td></td>
</tr>
<tr>
<td>Sampler:</td>
<td>PWSID #:</td>
<td></td>
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<tr>
<td>Phone #:</td>
<td>Quote #:</td>
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### State where sample(s) were collected:

### Sample Identification

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<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Grab</th>
<th>Soil</th>
<th>Composite</th>
<th>Sediment</th>
<th>Water</th>
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### Analysis Requested

#### Preservation Codes

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#### Analyses Requested

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<td>N = HNO₃</td>
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<tr>
<td>S = H₂SO₄</td>
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<tr>
<td>O = Other</td>
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### Turnaround Time Requested (TAT) (please check):

- Standard
- Rush

(Rush TAT is subject to laboratory approval and surcharges.)

### Date results are needed:

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<th>Date</th>
<th>Time</th>
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### Rush results requested by (please check):

- E-Mail
- Phone

### E-mail Address:

Phone:

### Data Package Options (please check if required)

- Type I (Validation/non-CLP)
- Type III (Reduced non-CLP)
- Type IV (CLP SOW)
- Type VI (Raw Data Only)

### EDD Required? (please check if yes, format: __________)

- Yes
- No

### If yes, format:

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<th>FedEx</th>
<th>Other</th>
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### Temperature upon receipt: __________ °C

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Eurofins Lancaster Laboratories Environmental, LLC • 2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 7045 0713
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CUSTODY SEAL

9601 San Leandro St. Oakland, CA 800-233-8425
**MAI clients MUST disclose any dangerous chemicals known to be present in their submitted samples in concentrations that may cause immediate harm or serious future health endangerment as a result of brief, gloved, open air, sample handling by MAI staff. Non-disclosure incurs an immediate $250 surcharge and the client is subject to full legal liability for harm suffered. Thank you for your understanding and for allowing us to work safely.**

*** If metals are requested for water samples and the water type is not specified on the chain of custody, then MAI will default to metals by £200.8.

**CHAIN OF CUSTODY RECORD**

**TURNOVER TIME:**
- RUSH ☐
- 1 DAY ☐
- 2 DAY ☐
- 3 DAY ☐
- 5 DAY ☐

**GeoTracker EDF ☐ PDF ☐ EDD ☐ Write On (DW) ☐ EQuIS ☐ 10 DAY ☐**

**Effluent Sample Requiring “J” flag ☐ UST Clean Up Fund Project ☐ Claim #______**

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**REPORT TO:**

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**E-Mail:**

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**Project #:**

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**Project Name:**

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**Project Location:**

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**Purchase Order #:**

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**Sampler Signature:**

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**Relinquished By:**

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<th>TCE/T</th>
<th>GOOD CONDITION</th>
<th>COMMENTS</th>
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**Relinquished By:**

<table>
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<tr>
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<th>Time</th>
<th>Received By</th>
<th>TCE/T</th>
<th>GOOD CONDITION</th>
<th>COMMENTS</th>
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**Relinquished By:**

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<th>Received By</th>
<th>TCE/T</th>
<th>GOOD CONDITION</th>
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**VOAS O&G METALS OTHER HAZARDOUS:**

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<tr>
<th>Preservation</th>
<th>pH&lt;2</th>
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</thead>
</table>
(THIS PAGE LEFT BLANK INTENTIONALLY)
Excavation Work Plan
Health and Safety Plan

Hamilton Square, 970 C Street
Novato, California

Prepared for
Thompson Development Inc.

April 2015

Andy Rodgers
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Appendix B: Exposure Pathway Flow Chart
1.0 INTRODUCTION

This Health and Safety Plan has been prepared to minimize the threat of serious injury to workers during the excavation activities at 970 C Street, Novato, California (Site).

It is the responsibility of every person working on the project site to behave cautiously and avoid actions or situations that could jeopardize his or her own safety and well-being. This Site Safety Plan offers guidelines and precautions that the workers on this project should consider.

West Yost Associates (West Yost) is not responsible for enforcing the guidelines of this Health and Safety Plan. West Yost is not responsible or liable for the injuries of any person working on the project site with the exception of West Yost employees, to the extent that they are covered by Worker’s Compensation Insurance.

2.0 EMERGENCY RESPONSE

Dialing 911 on the telephone will provide access to ambulance, fire and police services.

2.1 Emergency Information

<table>
<thead>
<tr>
<th>Service</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambulance</td>
<td>911</td>
</tr>
<tr>
<td>Hospital</td>
<td>Novato Community Hospital</td>
</tr>
<tr>
<td></td>
<td>180 Rowland Way Novato CA 94945</td>
</tr>
<tr>
<td>Police</td>
<td>911</td>
</tr>
<tr>
<td>Fire Department</td>
<td>911</td>
</tr>
<tr>
<td>Poison Control Center</td>
<td>911</td>
</tr>
<tr>
<td>Agency Contacts</td>
<td>Scott Callow, County of Marin Environmental Health Department</td>
</tr>
<tr>
<td></td>
<td>Office: (415) 499-6907</td>
</tr>
<tr>
<td>Emergency Contacts</td>
<td></td>
</tr>
<tr>
<td>On-Site Manager</td>
<td>Andy Rodgers, West Yost</td>
</tr>
<tr>
<td></td>
<td>Office: (707) 666-4812 or</td>
</tr>
<tr>
<td></td>
<td>Mobile: (707) 480-1019</td>
</tr>
<tr>
<td>Project Manager</td>
<td>Peter Dellavalle, West Yost</td>
</tr>
<tr>
<td></td>
<td>Office: (707) 666-4814 or</td>
</tr>
<tr>
<td></td>
<td>Mobile: (707) 490-5040</td>
</tr>
</tbody>
</table>
2.2 Hospital Route – Novato Community Hospital

Novato Community Hospital is the nearest hospital to the Site. The route (directions) to the hospital is described as follows (see Site Vicinity and Hospital Location Map in Appendix A):

- Head southwest on C St toward Main Gate Rd
- Turn right on to Main Gate Rd
- Turn right on to Nave Dr
- Take the ramp to US-101 N
- Turn right on to US-101 N
- Take the Rowland Blvd exit
- Turn right on to Rowland Blvd
- Turn left on to Rowland Way
- Novato Community Hospital is on the right side of the street at:
  180 Rowland Way, Novato, CA 94945

3.0 PURPOSE

This site safety plan is designed to protect the health and safety of personnel engaged in excavation activities from potential hazards associated with those activities. All such personnel will be briefed on the site safety plan and will have access to the plan at all times.

4.0 HAZARDS

This section assesses the chemical and physical hazards that are known to exist at the Site and those that may be created by the remediation effects.

The known hazards associated with this site are:

- Underground/overhead utilities,
- Chemical injury from contaminants potentially existing in soil,
- Physical injury from heavy equipment accident,
- Physical injury from sampling equipment and activities, and
- Trip/fall from site construction debris and/or equipment.

4.1 Utility Lines

Underground utilities were located for the drilling project. Underground Service Alert (USA) will be notified prior to drilling operations.
4.2 Chemical Hazards

The primary chemical of concern (COC) at this site is methyl tert-butyl ether (MTBE). Additional COCs include petroleum related hydrocarbons including benzene, ethylbenzene, toluene, and xylenes. Gasoline is flammable, explosive, and toxic through inhalation, ingestion, or dermal contact. Benzene – a constituent of gasoline – is considered carcinogenic to humans. Physical symptoms of exposure to these contaminants may include nausea, blurred vision, dizziness, or headaches. Work required in this project may expose personnel to materials that might contain any or all of these contaminants. Any personnel entering the Site shall be informed of all hazards associated with these contaminants.

The Occupational Health and Safety administration’s (OSHA) Permissible Exposure Levels (PELs) for inhalation, in terms of the 8-hour time-weighted average (TWA) and the 15-minute short term exposure level (STEL), for these chemicals and gasoline are as described in Table 1 (29 CFR 1910.1000, 54 FR 2920, January 19, 1989, and California Department of Industrial Relations Permissible Exposure Limits for Chemical Contaminants).

<table>
<thead>
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<th>Table 1. OSHA Permissible Exposure Levels</th>
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<tr>
<td>TWA</td>
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<tr>
<td>Benzene</td>
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<tr>
<td>Ethylbenzene</td>
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<tr>
<td>Toluene</td>
</tr>
<tr>
<td>Xylenes</td>
</tr>
<tr>
<td>Gasoline</td>
</tr>
<tr>
<td>MTBE</td>
</tr>
</tbody>
</table>

4.3 Physical Hazards

The physical hazards expected to be present at the Site may include:

- Drilling Equipment
- Moving Equipment
- Heavy Equipment
- Power/hand tools
- Saw Cutting
- Snapping Cables, Slings and Rope
- Sharp Objects
- Loose Foundations
- Open Pits or Ditches
- Lifting Hazards
- General Debris
- Excessive Noise
- Fire/Explosions
- Weather Hazards
- Heat Stress
5.0 RISK CONTROL

This section describes the procedures to follow to ensure the avoidance of operational hazards.

5.1 Accident Prevention (General)

While work is in progress, only persons authorized by the site safety officer will be permitted entry.

Site-specific training in the use of equipment, as well as safety precautions, will be provided during the pre-field safety meeting. The training will be repeated for any worker not present for the initial training. The safety meeting will review the work scheduled for the Site, expected hazards, special conditions, equipment locations, Material Safety Data Sheets (MSDS) and generic hazardous substances information and required safety procedures and equipment. Daily, pre-shift “tailgate” meetings will summarize the health and safety plan and review any new revisions to the site safety plan. Written attendance and meeting records of all safety meetings will be maintained with the project file.

All personnel on site will receive the following instructions:

- Keep hands away from face while they might be contaminated.
- Do not eat, drink, or smoke while hands might be contaminated.
- Stay well clear of heavy machinery while in operation unless involved in its operation.

5.2 Mechanical Hazards

The following procedures shall be followed during all phases of the operation to reduce those risks associated with mechanical equipment:

- Stay well clear of drill rods and augers while they are rotating and being hoisted. Extreme care is to be exercised when steel cables are being used to lift the drilling apparatus from the ground.
- Stand clear of the operating circle of excavators, backhoes, etc.
- Equipment maintenance schedules are the responsibility of each individual contractor. Equipment is to be checked daily. Any equipment deemed to be in an unsafe state of repairs, or operated in an unsafe manner shall be shut down until corrective action is taken. Equipment safety features, such as back-up alarms, shall be checked daily.

5.3 Electrical Hazards

The following procedures shall be followed during all phases of operation, in order to reduce those risks associated with electrical hazards:

- USA will be contacted prior to site activities to locate the presence of underground cables, utility lines, pipes, and storage vessels.
HEALTH AND SAFETY PLAN

• The local power company shall be contacted, in order to verify the minimum allowable clearance from high-voltage power lines. Under no circumstances will any person, piece of equipment, or phase of operation come within 10 feet of overhead power lines.

• If the work area is unavoidably close to buried or overhead power lines, the power shall be turned off, with the circuit breaker locked and tagged out.

• All electrical equipment is to be properly grounded, and under no circumstances are any modifications to be made to any piece of electrical equipment. All electrical equipment is to be inspected daily for damaged leads or plugs. Any piece of equipment that is damaged shall not be used on the Site, and shall be removed from the Site for disposal or repair.

• If splicing wires must connect electrical equipment, the source shall be de-energized first; the breaker box locked out and appropriately tagged by the person who is to perform the splicing operation. All connections are to be appropriately taped. Once the splicing operation is complete, the person who performed the splice shall bring the source back into operation.

• Each person that has cause or need to use a piece of electrical equipment shall ensure that he/she is fully familiar with the equipment’s operation and features.

5.4 Chemical Hazards

To reduce the possibility of injury due to chemical hazards, personnel shall wear those pieces of Personal Protective equipment as specified by the task, in section 6.0 (Personal Protective Equipment).

The likelihood of exceeding the OSHA PELs (Table 1) during the performance of the work outlined in this plan is considered to be low due to the ventilated conditions and low concentrations of constituents previously documented at the Site. However, half-face air purifying respirators with organic vapor cartridges, fit-tested for each employee present, will be available on site. If warranted by OVM readings, periodic air monitoring will be conducted during the on-site work with Sensidyne- or Dreager-type detector tubes and pump, which will provide immediate information on airborne benzene concentrations. Should the testing methods indicate potentially hazardous concentrations of airborne contaminants, or if any of the symptoms are noted or observed in any of the on-site personnel, corrective action will be taken, including using respirators, if necessary.

ECON and Blankinship & Associates (2007) developed a flow chart that depicts complete exposure pathways for on-site trench workers (outdoor air) of the adjacent site to the north of the Site, which has similar subsurface conditions and is also impacted with hydrocarbons in subsurface soil and groundwater (Appendix B). The flow chart Exposure pathways and potential receptors discussed below are based on this flow chart, with the exclusion of exposure pathways for building occupants (indoor and outdoor air), of which there currently are none.
5.4.1 Pathways C1 and C2: Soil Ingestion

During excavation activities at the Site, it is possible that adult on-site workers could accidentally ingest soil or groundwater during their activities. Workers will be made aware of the potential hazard and will be advised to wear personal protective equipment and to wash hands before eating or drinking.

5.4.2 Pathways C3 and C4: Dermal Absorption

Site workers will be required to wear personal protective equipment (PPE) such as gloves, coveralls, Tyvek, or like material to limit or prevent contact with soil.

5.4.3 Pathways C6 and C7: Ingestion of Groundwater by On-site Worker

The water underlying the Site is not used for municipal, domestic, industrial process, industrial service or agricultural water supply or to replenish surface water. Water beneath the Site will not be used as a source of drinking water and therefore no receptors will be exposed by this route.

If groundwater is encountered during drilling or excavation activities, it is unlikely to appear potable as a result of mixing with silt and dirt created during excavation activities. As a result, it is highly unlikely that workers will be inclined to drink the water.

5.4.4 Outdoor Air Inhalation by On-site Worker

In accordance with the soil and groundwater management plan, dust control measures will be in place during excavation activities at the Site. The on-site worker is therefore not expected to be exposed to COCs in airborne dust at the Site.

5.5 Acoustical Hazards

In order to prevent hearing impairment, the use of earplugs or earmuffs shall be required for all personnel when heavy equipment is in use at the Site. However, should any personnel develop pain in the ear due to work-site noise, they shall immediately don a set of earplugs or muffs. Noise levels will also be controlled to conform to local ordinances.

5.6 Biological Hazards

In order to reduce the risk of biological contamination, PPE (Section 6.0) shall be worn for each specific task. This protective equipment shall be removed, and hands and face washed prior to contact with the mouth, by the hands, for such purposes as eating, drinking, or smoking. Smoking shall only be permitted in designated areas.

5.7 Heat Stress

If the ambient temperature exceeds 80°F, workers will be observed for signs of heat stress. Breaks will be taken if any worker exhibits symptoms of heat stress. The breaks will last until symptoms are relieved and/or the pulse of the worker is less than 110 beats per minute. As a preventative measure, workers will be instructed to drink fluids to keep hydrated. For severe heat stress, a health-care professional will examine workers as soon as possible.
All personnel entering the work area should be familiar with the signs and symptoms of heat stress. These include:

- **Heat Exhaustion**—Dizziness, light-headedness, slurred speech, rapid pulse, confusion, fainting, fatigue, copious perspiration, cool skin that is sometimes pale and clammy, and nausea.
- **Heat Stress**—Hot, dry, flushed skin; delirium, and comma (in some cases).

### 5.8 Elevated Work

Some work tasks may require workers to access work areas above the ground. In these instances, a stairway, ladder, ramp, or personal hoist will be provided. Activities will use general safe access and fall protection safety in accordance with California Code of Regulations (CCR) Title 8.

Ladders will be inspected before each use. Broken or damaged ladders will be tagged and not used. Ladders will be chosen as appropriate to the load, size and task requirements. Ladder inspection, use, and care will follow safe work practices identified by the manufacturer.

### 5.9 Excavation Hazards

Spoil piles and equipment will be placed at least 2 feet from the edges of open excavations. Utilities will be located before excavating begins. A Cal/OSHA Trench and Excavation Permit will be acquired and available on site for all excavations and trenches greater than 4 feet deep into which employees may enter to do work. Workers will not enter excavations containing groundwater unless a dewatering plan signed by a professional engineer is in effect. Any signs of previously disturbed soil, or vibrations from adjacent machinery or traffic, will be monitored as the excavation proceeds. Excavations and trenches deeper than 5 feet will require protective systems (e.g. sloping, shoring, trench boxes) to be in place. Whenever possible, situations involving entry into an excavation of any depth will be avoided.

### 5.10 Confined Space Hazards

When work is to be done in an area where the natural circulation of fresh air or the ability to readily escape the site is restricted, that site shall be considered a confined space, and the following guidelines shall be followed:

- Personnel shall monitor the levels of oxygen, combustible gasses, and organic vapors prior to entering. Under no circumstances shall the space be metered if the following levels are exceeded:
  1. Oxygen content is less than 19.5%
  2. Combustible gas level is greater than 3% of the LEL.
  3. Total hydrocarbons are greater than the action levels defined in Table 3 of this section, if all air contaminants have not been identified.

- Personnel shall monitor the levels of oxygen, combustible gasses, and organic vapors continuously while inside the confined space. If the values stated in the above are exceeded, the space shall be evacuated immediately.
At least one additional person, who shall be present for the express purpose of monitoring the personnel in the space, shall be within sight and call of those personnel within the space, while remaining outside of the space proper. This person shall have, readily available to him; all rescue equipment necessary to remove personnel who may require extraction from the space and the Site. This equipment shall include, but not be limited to, respiration equipment of the same level as those used by the personnel in the space, first aid equipment, including compresses, harness, and all the extraction equipment.

Portable fans or blowers shall be used to introduce fresh air into the confined space. These fans or blowers shall be located on the upwind side of the space. The space shall not be entered until values of oxygen, organic vapors, and combustible gasses are brought below and measured below their respective action levels.

- No personnel shall enter any unshored or unsupported excavation with a depth greater than 5 feet, or with unstable geological conditions.

5.11 Miscellaneous

The following miscellaneous safe working practices will be followed at all times:

- The site safety officer will account for all employees at the beginning and the end of each shift.
- Eating, drinking, chewing gum or tobacco, and smoking are prohibited during work operations, unless on break in a designated area.
- Contact with contaminated media will be minimized.
- Equipment and vehicles will not block roadways or exits from any building.
- Drummed material will be handled with equipment specifically designed for drums (drum slings and/or drum dollies).
- Workers will not stand near excavator bucket swing areas or earthmoving equipment, under elevated loads or ladders, or near the edges of excavations.

6.0 PERSONAL PROTECTIVE EQUIPMENT

The following modified Level D PPE will be used as necessary for site activities within work areas:

- Impervious clothing (gloves, Tyvek) shall be worn unless the Site Safety and Health Officer does not believe necessary. If hazardous materials (i.e. exposure to COCs) are encountered, employees will have the option, depending on the activity, to wear cotton/polyester, Nomex, or Tyvek coveralls large enough to fit over work clothing with sleeves and legs unrolled.
- Chemical-resistant, leather, electrical resistant or felt work gloves shall be worn depending upon the hazard.
- Safety glasses, goggles, or face shields, unless wearing a full-face respirator.
• Steel-toe/shank boots and boot covers if boots are not chemical resistant or materials cannot be adequately decontaminated (leather boots are typically appropriate when working with/on contaminated materials).

• Hard hat with high-voltage and impact resistance (Class B and/or E).

• High-visibility reflectorized safety vest when working with or near mobile equipment, vehicular traffic, locations with poor visibility (i.e. fog) and night operations.

Each worker will be responsible for maintaining his or her own PPE.

The level of protection can be increased by the site safety officer. Depending on the outcome of air monitoring readings, appropriate respiratory protection may be required if sufficient engineering controls cannot be established.

7.0 DECONTAMINATION

The type, level, and context of contamination at the Site do not warrant personal decontamination procedures beyond washing hands and removing disposable clothing on site. Disposable items and decontamination rinseate will be disposed of in the appropriate manner.
## Air Monitoring Records

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HEALTH AND SAFETY PLAN

Site Safety Review Meeting

Date: ____________ Time: ____________ Project Number: ____________

Site Location

Attendees

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FIGURE 1

Health and Safety Plan
Hamilton Square
970 C Street, Novato, CA
(T0609592161)

Site Vicinity and Hospital Location Map

LEGEND
- Novato Community Hospital
- Approximate Site Boundary
- Road
- Water Body
- Creek
- City of Novato

1. Head southwest on C St toward Main Gate Rd
2. Turn right onto Main Gate Rd
3. Turn right onto Nave Dr
4. Take the ramp to US-101 N
5. Turn right onto US-101 N
6. Take the Rowland Blvd exit
7. Turn right onto Rowland Blvd
8. Turn left onto Rowland Way
9. Novato Community Hospital is on the right side of the street at:

180 Rowland Way
APPENDIX B

Exposure Pathway Flow Chart
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Plate 2. Conceptual Site Model
Hamilton Air Force Base
Parcels 1A and 1B

Primary Sources
Primary Release Mechanisms
Secondary Sources
Potential Release Mechanism
Pathway
Potential Exposure Route
Site occupant
On-site Trench Worker

Human Receptors

Leaking Underground Storage Tanks 957 & 970 and Maintenance Operations
Infiltration & Percolation

Soil
Adsorption → Adhesion to Soil → Soil Ingestion
C1 C2
Desorption → Absorption of Liquid → Dermal Absorption
C3 C4
Volatilization → Inhalation of Gas
Indoor Air Inhalation
X C5
Outdoor Air Inhalation
X X

Groundwater
Volatilization into Soil Vapor
Inhalation of Gas
Indoor Air Inhalation
X C5
Outdoor Air Inhalation (via open utility trench)
X X

Infiltration/Percolation
Ingestion of Groundwater
Ingestion
C6 C7

Absorption of Groundwater
Dermal Absorption
C3 C4

Vegetative Uptake
Ingestion
C10 C10

Notes:
"X" Indicates Complete Exposure Pathway to be Considered in PEA.
"C" indicates that pathway is considered, but incomplete, and therefore not considered. Explanation presented in Section 9.0.

CSM Tables 1-3 and Figure 3, CSM Figure 3
5/30/2007
Blankinship & Associates
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